



# Clay-Free DRIL-N® Fluid Helps Prevent Instability, Formation Damage on Depleted Deepwater Injector

## RESERVOIR DRILLING FLUID ENABLES OPERATOR TO REACH TARGET ZONE AHEAD OF PLAN

MISSISSIPPI CANYON, GULF OF MEXICO

### CHALLENGES

An operator in deepwater Gulf of Mexico needed to drill a 1,500-foot (457-meter) injection zone.

- » Highly depleted
- » Estimated overbalance of 7,000 psi
- » Maintaining adequate pressure in the reservoir and minimizing formation damage were also concerns

### SOLUTIONS

The Baroid tech team proposed displacing to a DRIL-N® system built with an IO base fluid and a sized BARACARB® bridging agent.

- » Clay-free formulation to help prevent formation damage
- » Sized BARACARB bridging agent recommended to minimize filtrate invasion

### RESULTS

The entire interval was drilled with no issues and no losses.

- » Achieved penetration rate of 54 feet/hour (16 meters/hour)
- » Reached target zone 45 hours ahead of plan
- » Screens run to bottom successfully
- » Operator able to achieve targeted 20,000-bwpd injection rate

### OVERVIEW

A major operator in the Gulf of Mexico planned to drill a deepwater injection well to enhance oil recovery. Maintaining adequate pressure in the reservoir via injection was a priority for the operator, and minimizing formation damage while drilling would help preserve injectivity.

The target zone was a 15-foot-thick (5-meter-thick) depleted sand. Based on results from wellbore stability modeling, the operator determined that a 12.5-ppg equivalent mud density was needed to maintain wellbore stability during static times. The estimated overbalance was 7,000 psi. This presented a significant risk of differential sticking and fractures, as the equivalent circulating density (ECD) of the 12.5-ppg fluid would likely exceed the fracture gradient.

**ZERO  
LOSSES  
WHILE DRILLING  
1,500-FT INJECTION ZONE**

### ENGINEERED DRILLING FLUID MAINTAINS WELLBORE STABILITY WITH LOW ECD

The Baroid team recommended displacing to an 11.5-ppg DRIL-N® reservoir drilling fluid. The proposed clay-free system was specifically engineered for reservoir conditions. Its formulation included an internal olefin (IO) base fluid, along with a sized BARACARB® calcium carbonate, which is an acid-soluble, non-damaging bridging agent. The BARACARB particle sizes were optimized to help minimize filtrate loss while drilling the depleted zone.

Although the recommended 11.5-ppg density was below the pressure required for wellbore stability and well control, modeling performed with Baroid’s Drilling Fluids Graphics (DFG™) software demonstrated that the fluid would generate a dynamic ECD of 12.5 ppg – high enough to maintain stability, yet low enough to avoid fracture. To manage density during static intervals, the operator installed a managed pressure drilling (MPD) assembly.

### OPERATOR SAFELY REACHES TARGET INJECTION ZONE AHEAD OF PLAN

The 1,500-foot (457-meter) injection zone was drilled with an average penetration rate of 54 feet/hour (16 meters/hour) allowing the operator to reach the target 45 hours ahead of plan. No losses or stuck pipe incidents were observed throughout the operation. At total depth, the DRIL-N system was displaced to 12.5-ppg brine. Screens were run to bottom successfully, indicating good wellbore conditions. Formation damage was minimal, and the filter cake was thoroughly removed by acidizing, as per plan. The productivity index observed during initial water injection was 10 bbl/day/psi with zero tubing head pressure. The operator was able to reach its targeted 20,000-bwpd injection rate, with the ability to increase this rate if required.

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